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EXAMINER	
WOOD, KEVIN S	

ART UNIT	PAPER NUMBER
2874	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/058,085	NARA ET AL.	
	Examin r	Art Unit	
	Kevin S Wood	2874	

-- The MAILING DATE of this communication appears on th cover sheet with the c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-60 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-60 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 29 January 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 0502.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2-8, 27-33 and 52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how a waveguide can have a second width of the second end without having a first width of the second end. Does the second end have multiple widths? If the second end does have multiple widths, then each width needs to define both widths.

Claims 9-12 and 34-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how the waveguides have a third end portion and fourth end portion when now first end portion and second end portion have been defined. How many ends does each waveguide have?

Claims 14-26 and 39-51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how a waveguide can have a second width of the second end without having a first width of the second end. Does the second end have multiple widths? If the second end does have multiple widths, then each width needs to define both widths. It is also unclear how the plurality of

second single mode waveguides have a third end portion and fourth end portion when now first end portion and second end portion have been defined. How many ends does each waveguide have?

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 53-60 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,617,234 to Koga et al.

Referring to claim 1, Sasayama et al. discloses all the limitations of the claimed invention. Sasayama et al. discloses an arrayed waveguide grating optical multiplexer/demultiplexer comprising: at least one first optical waveguide (5-1); a first slab waveguide (5-2); an arrayed waveguide (5-4) connected to the at least one first optical waveguide via the first slab waveguide; a second slab waveguide (5-3); and a plurality of second optical waveguides (5-5) connected to the arrayed waveguide via the second slab waveguide, a number (N_{ch}) of the plurality of second optical waveguides being determined to substantially satisfy the following equation: $\Delta f_{fsr} = \Delta f_{ch} \cdot N_{ch}$ where Δf_{fsr} is Free Spectral Range of the arrayed waveguide grating optical multiplexer/demultiplexer, and Δf_{ch} is a frequency interval between frequencies of lights

to be input to the arrayed waveguide grating optical multiplexer/demultiplexer for being multiplexed or light to be output from the arrayed waveguide grating optical multiplexer/demultiplexer after being demultiplexed. See Fig. 5 and Fig. 9, along with their respective portions of the specification.

Referring to claims 53 and 54, Sasayama et al. discloses all the limitations of the claimed invention. Sasayama et al. discloses that there are M second optical waveguides (5-5). It is inherent that M could be an odd number. The figures clearly disclose that M may be greater than three. See Fig. 5.

Referring to claim 55, Sasayama et al. discloses all the limitations of the claimed invention. Sasayama et al. discloses an arrayed waveguide grating optical multiplexer/demultiplexer comprising: at least one first optical waveguide (5-1); a first slab waveguide (5-2); an arrayed waveguide (5-4) connected to the at least one first optical waveguide via the first slab waveguide; a second slab waveguide (5-3); and a plurality of second optical waveguides (5-5) connected to the arrayed waveguide via the second slab waveguide, a number (N_{ch}) of the plurality of second optical waveguides being determined to substantially satisfy the following equation: $\Delta f_{fsr} = \Delta f_{ch} \cdot N_{ch}$ where Δf_{fsr} is Free Spectral Range of the arrayed waveguide grating optical multiplexer/demultiplexer, and Δf_{ch} is a frequency interval between frequencies of lights to be input to the arrayed waveguide grating optical multiplexer/demultiplexer for being multiplexed or light to be output from the arrayed waveguide grating optical multiplexer/demultiplexer after being demultiplexed, such that the arrayed waveguide

grating optical multiplexer/demultiplexer functions as an interleaver optical. See Fig. 5 and Fig. 9, along with their respective portions of the specification.

Referring to claims 56 and 57, Sasayama et al. discloses all the limitations of the claimed invention. Sasayama et al. discloses that there are M second optical waveguides (5-5). It is inherent that M could be an odd number. The figures clearly disclose that M may be greater than three. See Fig. 5.

Referring to claim 58, Sasayama et al. discloses all the limitations of the claimed method. Sasayama et al. discloses a method for manufacturing an arrayed waveguide grating optical multiplexer/demultiplexer comprising: providing at least one first optical waveguide (5-1); providing a first slab waveguide (5-2); providing an arrayed waveguide (5-4) connected to the at least one first optical waveguide via the first slab waveguide; providing a second slab waveguide (5-3); and providing a plurality of second optical waveguides (5-5) connected to the arrayed waveguide via the second slab waveguide, a number (N_{ch}) of the plurality of second optical waveguides being determined to substantially satisfy the following equation: $\Delta f_{fsr} = \Delta f_{ch} \cdot N_{ch}$ where Δf_{fsr} is Free Spectral Range of the arrayed waveguide grating optical multiplexer/demultiplexer, and Δf_{ch} is a frequency interval between frequencies of lights to be input to the arrayed waveguide grating optical multiplexer/demultiplexer for being multiplexed or light to be output from the arrayed waveguide grating optical multiplexer/demultiplexer after being demultiplexed. See Fig. 5 and Fig. 9, along with their respective portions of the specification.

Referring to claim 59, Sasayama et al. discloses all the limitations of the claimed method. Sasayama et al. discloses a method for manufacturing an arrayed waveguide grating optical multiplexer/demultiplexer comprising: providing at least one first optical waveguide (5-1); providing a first slab waveguide (5-2); providing an arrayed waveguide (5-4) connected to the at least one first optical waveguide via the first slab waveguide; providing a second slab waveguide (5-3); and providing a plurality of second optical waveguides (5-5) connected to the arrayed waveguide via the second slab waveguide, a number (N_{ch}) of the plurality of second optical waveguides being determined to substantially satisfy the following equation: $\Delta f_{fsr} = \Delta f_{ch} \cdot N_{ch}$ where Δf_{fsr} is Free Spectral Range of the arrayed waveguide grating optical multiplexer/demultiplexer, and Δf_{ch} is a frequency interval between frequencies of lights to be input to the arrayed waveguide grating optical multiplexer/demultiplexer for being multiplexed or light to be output from the arrayed waveguide grating optical multiplexer/demultiplexer after being demultiplexed, such that the arrayed waveguide grating optical multiplexer/demultiplexer functions as an interleaver optical wavelength multiplexer/demultiplexer. See Fig. 5 and Fig. 9, along with their respective portions of the specification.

Referring to claim 60, Sasayama et al. discloses all the limitations of the claimed invention. Sasayama et al. discloses an arrayed waveguide grating optical multiplexer/demultiplexer comprising: at least one first optical waveguide (5-1); a first slab waveguide (5-2); an arrayed waveguide (5-4) connected to the at least one first optical waveguide via the first slab waveguide; a second slab waveguide (5-3); and a

plurality of second optical waveguides (5-5) connected to the arrayed waveguide via the second slab waveguide, a number (N_{ch}) of the plurality of second optical waveguides being determined to substantially satisfy the following equation: $\Delta f_{fsr} = \Delta f_{ch} \cdot N_{ch}$ where Δf_{fsr} is Free Spectral Range of the arrayed waveguide grating optical multiplexer/demultiplexer, and Δf_{ch} is a frequency interval between frequencies of lights to be input to the arrayed waveguide grating optical multiplexer/demultiplexer for being multiplexed or light to be output from the arrayed waveguide grating optical multiplexer/demultiplexer after being demultiplexed; and at least two optical multiplexer/demultiplexer units connected to the plurality of second optical waveguides. See Fig. 5 and Fig. 9, along with their respective portions of the specification.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2, 4, 6-9, 11, 13, 14, 18, 20, 23, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,506,712 to Sasayama et al. in view U.S. Patent No. 6,563,988 to McGreer.

Referring to claim 2, Sasayama et al. discloses all the limitations of the claimed invention except Sasayama et al. does not disclose a multimode waveguide being coupled between the at least one first optical waveguide and the first slab waveguide,

where the end of the multimode waveguide that is connected to the first slab waveguide has a larger width than the end of the multimode waveguide that is connected to the at least one first optical waveguide. McGreer discloses a tapered multimode waveguide section (100) being placed between an input waveguide (110) and a slab waveguide (120) for the purpose of minimizing the group velocity dispersion (GVD). Since Sasayama et al. and McGreer et al. are both from the same field of endeavor, the purpose discloses by McGreer et al. would have been recognized in the pertinent art of Sasayama et al. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a tapered waveguide section to between the input waveguide and the first slab waveguide, for the purpose of limiting the dispersion loses. See Fig. 1A and Fig. 2A of the McGreer et al. reference.

Referring to claims 4, 18 and 25, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention except neither appears to disclose at least one constant width waveguide provided between each of the at least one first optical waveguide and each of the at least one multi-mode waveguide, where the width of the at least one constant width waveguide is substantially equal to the first width of the first end portion of the at least one multi-mode waveguide. However, McGreer et al. does disclose that the end portion of the at least one first optical waveguide has a constant width that is substantially the same as the first end portion of the at least one multi-mode waveguide. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the end portion of the at least one first optical waveguide as a separate waveguide having the same width as the at least one

first optical waveguide, since it has been held that constructing a formerly integral structure in various elements involves only routine skill in the art. *Nerwin v. Erlichman, 168 USPQ 177, 179.* See Fig. 1A and Fig. 2A of the McGreer et al. reference.

Referring to claim 6, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention except neither appears to disclose the at least one multi-mode waveguide has a trapezoidal shape in which the first en portion is an upper base and the second portion in the lower base. McGreer et al. discloses the multi-modal tapered waveguide that is somewhat trapezoidal in shape, where the sides of the waveguide are slightly curved. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a trapezoidal multi-mode waveguide, since it has been held more than a mere change of form or shape is necessary for patentability. *Span-Deck Inc. v. Fab-Con Inc. (CA 8, 1982) 215 USPQ 835.*

Referring to claim 7, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention. Both references disclose a plurality of first optical waveguides. McGreer et al. discloses a plurality of multi-mode waveguides connected to the plurality of first optical waveguides. See the figures of the reference.

Referring to claim 8, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention. Sasayama et al. discloses that one of the first optical wavguides may be coupled to first slab waveguide without the use of a multi-mode waveguide. See the figures of the reference.

Referring to claim 9, Sasayama et al. discloses all the limitations of the claimed invention except Sasayama et al. does not disclose a multimode waveguide being coupled between each of the plurality of second optical waveguides and the second slab waveguide, where the end of the multimode waveguide that is connected to the second slab waveguide has a larger width than the end of the multimode waveguide that is connected to one of the second optical waveguides. McGreer discloses a tapered multimode waveguide section (220) being placed between an output waveguide (230) and a slab waveguide (190) for the purpose maximizing the coupling efficiency. Since Sasayama et al. and McGreer et al. are both from the same field of endeavor, the purpose discloses by McGreer et al. would have been recognized in the pertinent art of Sasayama et al. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a tapered waveguide section to between the each output waveguide and the second slab waveguide, for the purpose of improving the coupling efficiency between the waveguides. See Fig. 3A and Fig. 3B of the McGreer et al. reference.

Referring to claims 11, 20 and 23, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention except neither appears to disclose at least one constant width waveguide provided between each of the second optical waveguides and each the multi-mode waveguides, where the width of the at least one constant width waveguide is substantially equal to the width of the smaller end portion of the multi-mode waveguide. However, McGreer et al. does disclose that the end portion of each second optical waveguide has a constant width that is substantially the

same as the end portion of each of the multi-mode waveguides. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the end portion of each second optical waveguide as a separate waveguide having the same width as each of the second optical waveguides waveguide, since it has been held that constructing a formerly integral structure in various elements involves only routine skill in the art. *Nerwin v. Erlichman, 168 USPQ 177, 179.* See Fig. 1A and Fig. 2A of the McGreer et al. reference.

Referring to claim 13, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention. McGreer et al. clearly discloses that the multi-mode waveguide (220) is trapezoidal in shape. See Fig. 3B.

Referring to claim 14, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention. See the rejections of claims 2 and 9. Claim 14 simply combines the limitations of claims 2 and 9 into a single claim.

Referring to claim 26, Sasayama et al. in view of McGreer et al. discloses all the limitations of the claimed invention. See the rejections of claims 6 and 13. Claim 26 simply combines the limitations of claims 6 and 13 into a single claim.

Allowable Subject Matter

7. Claims 3, 5, 10, 12, 15-17, 21, 22, 24 and 27-51 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

Referring to claims 3, 5, 15, 19 and 21, the prior art does not disclose the combination of all the limitations of the claimed invention. Specifically, the prior art does not disclose at least one straight waveguide, having a width narrower than a first optical waveguide width of the at least one first optical waveguide, being connected between the first slab waveguide and the at least one first optical waveguide.

Referring to claims 10, 12, 16, 17, 22, and 24, the prior art does not disclose the combination of all the limitations of the claimed invention. Specifically, the prior art does not disclose a plurality of straight waveguides each provided between each of the plurality of second optical waveguides and each of the plurality of multi-mode waveguides, where each of the straight waveguides has a width narrower than the second optical waveguide width of each of the second optical waveguides.

Referring to claims 27-33 and claims 39-51, the prior art does not disclose all the limitations of the claimed invention. Specifically, the prior art does not disclose the at least one single-mode waveguide having one end wider than the other, where the wider end is coupled to the first slab waveguide and the narrower end is coupled to the at least one single first optical waveguide.

Referring to claims 34-38, the prior art does not disclose all the limitations of the claimed invention. Specifically, the prior art does not disclose a plurality single-mode waveguides having one end wider than the other, where the wider end is coupled to the

second slab waveguide and the narrower end is coupled to the one of the second optical waveguides.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin S Wood whose telephone number is (703) 605-5296. The examiner can normally be reached on Monday-Thursday (7am - 5:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B Bovernick can be reached on (703) 308-4819. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 307-0956.

KSW